



SHARDA
UNIVERSITY
Beyond Boundaries



**SHARDA SCHOOL OF
BASIC SCIENCES
& RESEARCH**



COURSE

**WASTE
TO ENERGY
(VAS703)**

VALUE ADDED
COURSE BROCHURE-30 HRS
2023-24

ABOUT THE UNIVERSITY

Sharda University envisions to serve the society by being a global University of higher learning in pursuit of academic excellence, innovation and nurturing entrepreneurship. It has 14,000+ students from 95+ countries, 29 states, and Union Territories, providing cultural diversity and global exposure to students. It has 26000+ alumni who are today leaders in their realms. Sharda University is NAAC A+ University with Overall NIRF Rank of 87. Teaching Learning Center at Sharda University is to equip the faculty members with the expertise, skills and knowledge they need for capacity building of students. Teaching as a profession requires highly specialized skills and knowledge to impact significantly on student learning and therefore teachers must refine their conceptual and pedagogical skills.

ABOUT SCHOOL

Sharda School of Basic Sciences and Research (SSBSR) boasts of providing an interdisciplinary approach, exposure to different disciplines in science including Chemistry, Biochemistry, Physics, Mathematics, Life Sciences, and Environmental Sciences. The Sharda School of Basic Sciences and Research is unique from other institutions of higher learning as it is committed to imparting knowledge in pure and applied sciences, which not only forms the foundation for further academic pursuits in science and technology but also acts as the foundation for students to pursue a career in multi facet directions. The academic programs are designed to meet the requirement of the latest technological developments and envisages to become a state-of-the-art department that cater the students at Graduate, Post- Graduate and Research level along with providing high- quality education and cutting-edge interdisciplinary research in sciences. SSBSR has well-equipped laboratories for Physics, MATLAB, Microbiology, Molecular Biology, Cell Culture, Virology, Biochemistry, Physical, Organic and Inorganic chemistry for Graduate and Post-Graduate Programs. In addition, there are Central Instrumentation Facility (CIF) and other advance research labs to promote research culture.

About Environmental Science Department

The Department of Environmental Science is to produce educated community who will ensure clean, safe, secured, and sustainable environment for all.

ABOUT COURSE

Waste to Energy: VAS703

This course aims to provide insights of various routes of waste to energy generation which include thermal, biological and chemical routes. Various wastes to energy recovery technologies are delineated along with their economical aspects to support the sustainable management of waste in rural and urban areas. The case studies of waste to energy generation throughout the world will be incorporated to provide a better understanding of contemporary practices of this field.

COURSE SCHEDULE

S. No.	Content	Duration
1.	Introduction to energy from waste	Week 1
2.	Scenario of waste generation	Week 2
3.	Waste to Energy generation process	Week 3
4.	Conversion Technologies	Week 4
5.	Case Studies	Week 5
6.	Test/Quiz	Week 6

RESOURCE PERSON

Dr. Km. Rachna

Dr. km. Rachna is Assistant Professor at Department of Environmental Science, School of Basic Science & Research, Sharda University (NAAC A+), Greater Noida, UP, India. Dr. km. Rachna is awarded with PhD degree in Nanoscience and Technology from Sharda University in 2020. During her Ph. D work, she has been worked as SRF in DRDO sponsored Project Her area of research is water treatment using nanocomposite and polymer thin film using different types of polymers. She has more than 10 years of research experience. She has published 16 research papers in reputed national/international journals, as of now. She has attended and presented research papers in various national and international conferences. During her research, she has published many research papers in reputed journal and book chapter also.

School: SSBSR Programme: PG Branch:		Batch : 2023 - 2024 Current Academic Year: 2024-2025 Semester :	
1. Course Code	VAS703		
2. Course Title	Waste to Energy		
3. Credits			
4. Contact Hours (L-T-P)	30 Hours		
Course Type	Value added course		
5. Course Objective	<ol style="list-style-type: none"> 1. To provide knowledge about Waste to Energy. 2. To enable student to understand the technical and management principles for production of energy form waste. 3. To build the understanding of the best available technologies for waste to energy. 4. To analyze waste management practices for waste minimization and resource recovery 5. To enable the understanding of technological advancements and innovation for waste to energy 6. To provide knowledge about real time observation of case studies. 		
6. Course Outcomes	<p>On successful completion of the course, students will be able to:</p> <p>CO1: Explain the technologies for waste to energy options</p> <p>CO2: The student will be able to understand about the waste generation scenario.</p> <p>CO3: Explain the waste to energy generation process.</p> <p>CO4: Explain the concept of waste to energy conversion technologies in contemporary era (such as gasifiers/reactors, biogas digesters, fermenters).</p> <p>CO5: Explain about various recycling and recovery of resources from various solid/liquid wastes</p> <p>Co6: The student will be able to understand about the sustainable practice waste management practices for clean and green society</p>		
7. Course Description	<p>This course aims to provide insights of various routes of waste to energy generation which include thermal, biological and chemical routes. Various wastes to energy recovery technologies are delineated along with their economical aspects to support the sustainable management of waste in rural and urban areas. The case studies of waste to energy generation throughout the world will be incorporated to provide a better understanding of contemporary practices of this field.</p>		
8. Outline syllabus			CO Mapping
Unit 1	Introduction to energy from waste		
A	Importance of waste-to-energy in sustainable waste management		CO1/CO6
B	Characterization and classification of waste as fuel Sources and types of wastes– agro based, forest residues, industrial waste, Municipal solid waste.		CO1/CO6
C	Physical, chemical and biological properties of wastes		CO1/CO6
Unit 2	Scenario of waste generation		
A	Urban and rural scenario waste generation		CO2/CO6
B	Indian scenario on energy from waste		CO2/CO6
C	Global scenario on energy from waste		CO2/CO6
Unit 3	Waste to Energy generation process		
A	Combustion (unprocessed and processed fuel), Factors affecting, environmental and health impacts		CO3/CO6
B	Gasification, Factors affecting, environmental and health impacts Pyrolysis, Factors affecting, environmental and health impacts		CO3/CO6
C	Anaerobic digestion, fermentation, Factors affecting, environmental and health impacts.		CO3/CO6
Unit 4	Conversion Technologies		
A	Combustors (Spreader Stokes, Moving grate type, fluidized bed).		CO4/CO6
B	Gasifier, digesters. Briquetting technology: Production of RDF and briquetted fuel.		CO4/CO6
C	Biogas digesters, fermenters, etc.		CO4/CO6
Unit 5	Case Studies		
A	Success and Failures of Indian Waste to Energy plants,		CO5/CO6
B	Case studies highlighting pyrolysis and gasification technologies Conversion of waste into syngas and biofuels.		CO5/CO6
C	Role of the Government in promoting 'Waste to Energy'		CO5/CO6
Mode of Examination	Quiz/Viva		
Other References	<ol style="list-style-type: none"> 1."Waste to Energy: Technologies and Project Implementation" by Marco J. Castaldi. 2.Waste to Energy Conversion Technology" by Naomi B. Klinghoffer. 3.Report of the task Force on Waste to Energy, Niti Ayog (Formerly Planning Commission) 2014. Municipal Solid Waste Management Manual, CPHEEO, 2016 4.Industrial and Urban Waste Management in India, TERI Press. 		